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ABSTRACT

This curriculum material is designed to be used effectively in any adult literacy and basic education program to develop numeracy skills in learners with an interest in cars. This flexible course consists of six units. It can be taught as a short course, units can be taught individually, and units can be taught in any sequence. Each unit is divided into two sessions, each taking approximately 2 hours. Each unit includes an overview of the unit and the sessions, a list of the materials required for each session, activities, and handouts. Activities contain two different types of information: notes for the teacher and suggestions of what the teacher could say to the learner. At the end of each session, learners are asked to spend a few minutes evaluating the session and discussing any concerns they have about the session and if it is meeting their needs. A student evaluation sheet is included in Handout 4 in Unit 1 and should be used by the learners at the completion of each session. Unit titles are Getting Started; Buying a Car; How Much; Keeping Your License; Paying for a Car; and Running Costs. The booklet concludes with a teacher's checklist for each student. (YLB)

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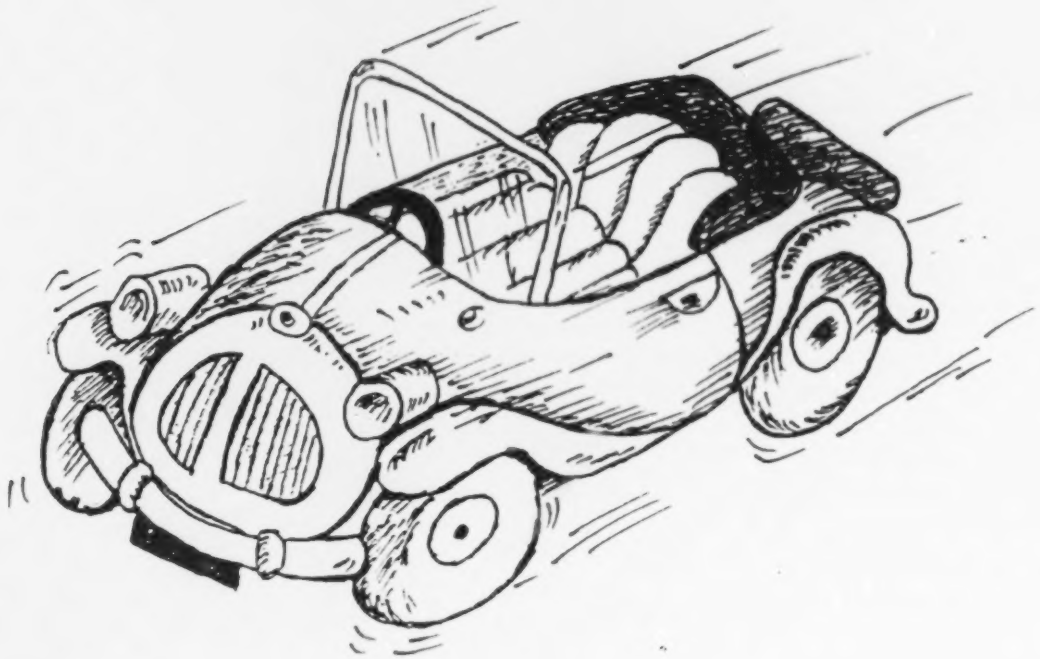
ED 415 438

CAR COSTS

Six Units of Maths
Around the Theme of Car Ownership



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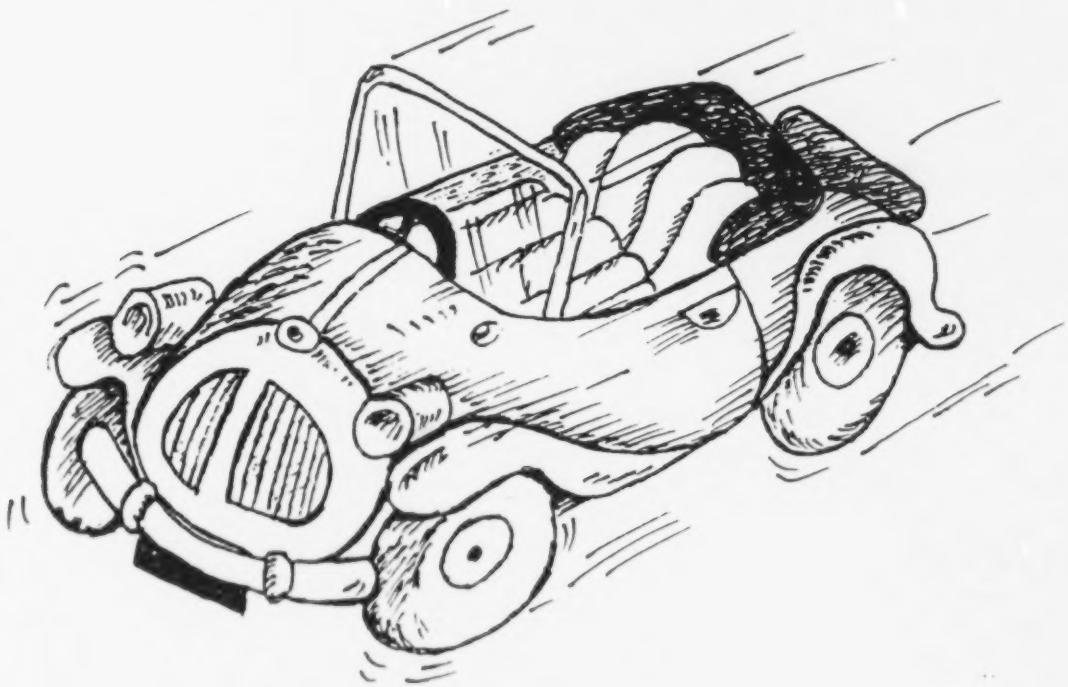

Written by: Chris Wearne

South West TAFE
South West College of Technical and Further Education
WARRNAMBOOL

Adult Education in
the Community

Car costs: Six Units of Maths Around the Theme of Car Ownership
Chris Wearne

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DEDICATION

About the author - Chris Wearne

Chris Wearne loved teaching numeracy, but not the traditional numeracy of sets of exercises from textbooks and worksheets that bore little resemblance to the real world. Rather, for Chris the challenge of numeracy was to make it real; to make it directly related to the world her students knew and understood. She had a passion about making each numeracy session enjoyable, challenging and relevant. She also had a passion to convince fellow numeracy teachers to adopt a similar approach to their numeracy classes. Out of this passion was born the Car Numeracy Project, a project that would enable her students to develop their numeracy skills through the study of something they knew lots about - cars.

Chris developed this Adult, Community and Further Education Board funded project whilst working as a staff member of the General Education Department at South West Institute of TAFE. Chris joined the Department in 1985, first as the Warrnambool and District Adult Literacy Program Co-ordinator, then later as the College's Study Skills Co-ordinator. With the development of the Certificates of General Education for Adults (CGEA), Chris became the numeracy Co-ordinator and mentor for the Department and the south west region of the State. Chris was killed in a motor car accident whilst returning from a CGEA inter-regional moderation meeting in June 1995.

CONTENTS

Preamble vii

Unit 1: Getting started 1

Unit 2: Buying a car 23

Unit 3: How much 27

Unit 4: Keeping your licence 32

Unit 5: Paying for a car 37

Unit 6: Running costs 40

Teacher's checklist 46

Resources 47

Preamble

This project, to write and trial materials to assist adults to develop numeracy skills through a common interest in cars, was undertaken by the South West College of TAFE for the Adult, Community and Further Education Board, Victoria.

The aims

The specific aims of the project were:

- to increase participants' confidence and self-esteem in a group setting
- to develop participants' tangible, everyday numeracy skills
- to stimulate participants' interest in further numeracy development
- to support learners studying Numeracy and Mathematics at Level 2 or 3 of the Certificates in General Education for Adults.

The objectives

To create a non-threatening environment and manner of delivery that capitalises on the participants' familiarity with car ownership and maintenance.

To recognise the mathematical skills related to the everyday activities that people take for granted and do not think of as maths.

To develop participants' confidence in estimating and their capacity to participate in practical activities relevant to their needs.

To make students aware of the options for further study - where do they go from here with their Maths? Counselling in careers and courses needs to be readily available to students to assist with their selection of suitable further study.

To present material that supports learners studying Numeracy and Mathematics at Level 2 or 3 of the Certificates in General Education for Adults.

How Car Costs was developed

Car Costs was trialed with two groups of students who were enrolled in short courses at TAFE. The *Women in Trade* group, who were doing a full time six month course, had already been working together for one term. The other group taught was a Koorie Pre-Vocational Group.

The students who trialed this material were early school leavers who entered this course with numeracy skills at approximately Levels 2 or 3 of the Certificates of General Education for Adults.

The Koorie group attended two days a week for one term. They did the **Car Costs** course for 12 sessions of two hours each over six weeks (giving a total of 24 hours).

The *Women in Trade* group did not require basic skill development and did an adaptation of this program also over six weeks, but for three hours a week (giving a total of 18 hours).

Participants were asked to comment after each lesson on their reactions to, and evaluation of, the class. A teacher checklist was designed to record students' motivation levels, attitudes towards maths and the skill development of each participant.

Who should use this material

This curriculum material could be used effectively in any adult literacy and basic education program where learners have an interest in cars.

Although not specifically linked to the Certificates in General Education for Adults, **Car Costs** could be used effectively to support learners studying the Numeracy and Mathematics Stream at Level 2 or 3. The content could also be easily integrated with other Streams to cover learning outcomes in the Reading and Writing, Oral Communication and General Curriculum Options Streams.

Structure of the materials

Car Costs is a flexible course consisting of six Units. It can:

- be taught as a short course, or
- units can be taught individually, and
- units can be taught in any sequence.

Each Unit is divided into two sessions, each taking approximately two hours.

The units include:

- an overview of the Unit and the Sessions
- a list of the materials required for each Session
- Activities
- Handouts.

In the Activities there are two different types of information :

- notes for the teacher
- suggestions of what the teacher could say to the learner.

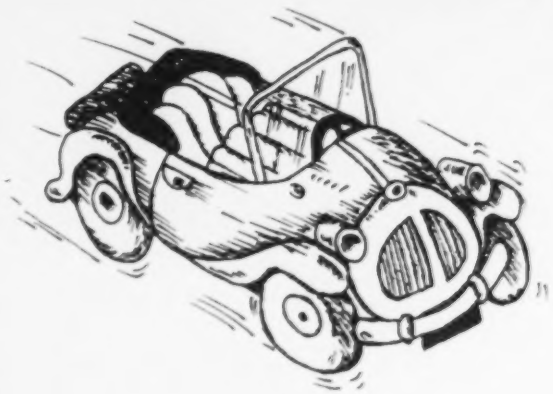
Suggestions of what the teacher could say to the learner is written in a different font.
For example:

To get to know each other a little more, we will break into pairs.

Evaluation

At the end of each session learners are asked to spend a few minutes evaluating the session and discussing any concerns they have about the session and if it is meeting their needs. A ***Student evaluation sheet*** is included as **Handout 4** in **Unit 1**. This Sheet should be used by the learners at the completion of each session.

Unit 1: Getting started



This unit is suitable for any new group of maths students. The first session attempts to put them at ease with each other and with maths. In Session 2 students discuss returning to study and review basic maths operations.

Session 1: Getting to know you

After general introductions and looking at their attitudes to maths, students will feel more comfortable with each other. For some students this session will be very different from any maths lesson they may have had before. Fears and anxieties about maths when openly discussed can become less intense.

Students need to know that learning is their responsibility but as teachers and fellow students, all will try to assist each other. This session needs to be light hearted and fun. We want to see them come back.

If you are working with a new group of students, begin with **Activity 1**. This *warm-up* activity is suitable for any new group of students. If the students participate in discussion from the first session, they will expect to participate in all sessions.

For a group that has previously worked and knows each other well, begin at **Activity 2**.

Everyone concentrates better if they have a break. Remember to give students a break after an hours work.

Materials needed:

- Name tags
- Course outline.

Activity 1: Getting to know you

Welcome / Name Tags / Course Outline / Timetables / Room / Toilets (tour of building if necessary)

Introductions:
Now to get to know each other a little more, we will break up into pairs, preferably with someone you do not know at all or not very well.

The teacher should be a participant in this activity as well.

You might ask questions like:

- How long have you lived here?
- Where were you born?
- Why did you come to this course?

After 5 minutes tell the class that their partner will introduce them to the group. (Allow another 5 minutes).

Ask the person who was introduced, "Is there anything that needs clarifying?" "Are there any questions from the group?"

Continue until everyone has been introduced.

Activity 2: Maths anxiety

One way to make sure that we can monitor how much you will learn through this unit is to test at the beginning and then one at the end. This is only a very simple test and should not take more than 10 minutes.

Give out **HANDOUT 1:** ***Overcoming maths anxiety*** face down.

Watch clock and then as in exam conditions.
Say:
Turn the page over *now*. You have until ..... to finish this paper.

Wait for a few seconds and then discuss emotions.
For example,

- How was your body reacting? (clammy, rigid etc.)
- How did you feel when you turned the page? (cheated, relieved)
- How did you react to test situations at school? (nervous, felt beaten before starting)

The students' reading ability will determine whether you work through each question orally or allow time for them to complete **HANDOUT 1**.

It is not essential to finish every sentence. Read aloud the sentence beginning and encourage some class responses.

Go through each question and encourage as much discussion as possible.

Handout 1 is from ***Mathematics A New Beginning***, Beth Marr & Sue Helme (ed), ***Mathematics A New Beginning***, Teaching Maths to Women Project, State Training Board of Victoria, 1987, page GS13.

When looking at question 10 (*The maths skills that I have a block about are ....*).

Ask:
How did you cover up not having these skills? Were there strategies that you used to get out of doing these problems?

What is it like to have an area in which you feel uncomfortable and exposed? (Relate to expectation that people have that maths teachers, for instance, should be good at mental arithmetic, as something with which you yourself feel a bit uncomfortable).

Subtraction, division and fractions are really common areas that many adults have problems with and try to hide from continuously. Treat this class as a second chance and please ask if you are having a hard time at grasping anything. Other class members may be able to explain things more easily than your teacher.

Make the most of this opportunity to learn or revise the skills in maths that you would like to have.

Look at one of the areas that students said they had a block with on **HANDOUT 1** (eg. Fractions), and teach a mini-lesson where you use a range of good and bad teaching strategies, such as:

- questions directed at the group
- questions directed at individuals
- asking students to take notes or draw a diagram
- a timed exercise which you correct in class
- group or partner work
- using hands-on-material
- an untimed exercise
- while teaching, walk around the room and check student's progress.

Now we are going to look at the most common block that you have and that is what will be taught.

The purpose of this exercise is to be aware of what makes you feel anxious, panic stricken or inadequate.

It is also an opportunity for you to discover what you enjoy about learning maths and how you learn best.

Discuss:

How did you feel when you

- had to listen, take notes or draw diagram?
- were asked to complete a timed exercise?
- did not understand something?

- worked in a small group or with a partner?
- used hands-on material?
- had to answer a question?
- when I was walking around the room and checking your progress?

What aspects of the lesson *raised* your anxiety?

What aspects of the lesson *reduced* your anxiety?

HANDOUT 2: *Overcoming maths anxiety*

Ask students to answer these questions and bring the answers to the next class.

If you do not have time to do your homework, then that is no excuse for not coming. Please still come.

Reassure the students that you are interested in their ideas, and that this is not a piece of writing to be assessed.

Activity 3: Course outline

In this course we will be looking at the care involved in owning, buying and keeping a car. Now if you know very little about cars, that is fine. You do not have to be a "motor head" or a mathematician to do this unit.

Hopefully, you will all get something out of it, and can teach each other a lot through our own life experiences.

HANDOUT 3: *Topics to be covered*

We will begin each topic with group discussion and then we will be able to relate this knowledge to our own skills level.

At the end of the unit, we hope that you will not only see that maths is more fun and relevant to everyday activities, but that you will have improved your maths skills and may even know more about cars.

Handout 2 is from ***Mathematics A New Beginning*** page GS17.
The original source of the ideas used in this unit can be seen in: ***Mathematics A New Beginning*** pages GS 9 to 20.
Beth Marr & Sue Helme (ed), ***Mathematics A New Beginning***, Teaching Maths to Women Project, State Training Board of Victoria, 1987

Activity 4: Evaluation

HANDOUT 4: ***Student evaluation sheet***

For the next five minutes, I would like you to think about what happened today in maths and how you felt about it. After each lesson, you will be asked to fill in comments about how you felt about that lesson.

Ask for comments or concerns to be raised in the class.
Is there anything that you would like to do next lesson? If anyone has any concerns, do not hesitate to see me after the lesson.

You should include this activity at the end of each session.

HANDOUT 1: *Overcoming maths anxiety*

Please complete these sentences:

1. I came to this course because _____

   _____

2. Mathematics is _____

   _____

3. In maths classes at school I felt _____

   _____

4. My maths teachers were usually _____

   _____

5. What I liked most about maths classes was _____

   _____

6. What I disliked most about maths classes was _____

   _____

7. When I had problems in maths classes or didn't understand something _____

   _____

8. To be good at maths you need to _____

   _____

9. My parents felt that maths was _____

   _____

10. The maths skills I have a "block" about are _____

    _____

11. I would like to learn more about _____

    _____

HANDOUT 2: *Overcoming maths anxiety*

1. Write about your own experiences in learning maths. Who or what caused you to feel the way you do about maths? Recall any incidents which contributed to any fears of maths.

2. Write about what you experienced in today's exercise in learning maths, and what you learned from it.

3. Suggest ways in which you can tackle fears of maths.

HANDOUT 3: *Topics to be covered*

Unit 1:	Getting started
Unit 2:	Buying a car
Unit 3:	How much?
Unit 4:	Keeping your licence
Unit 5:	Paying for a car
Unit 6:	Running costs

HANDOUT 4: *Student evaluation sheet*

COMMENTS: Please write how you felt about the lesson. What went well? Did you learn anything new? Was it fun? etc.

Unit 1: Session 1

Session 2

Unit 2: Session 1

Session 2

Unit 3: Session 1

Session 2

Unit 4: Session 1

Session 2

Unit 5: Session 1

Session 2

Unit 6: Session 1

Session 2

Session 2: Return to study & reviewing basic operations

Returning to study causes many anxieties. In the first two activities in this section students discuss concerns about returning to study, ways of dealing with anxieties and steps towards making return to study easier. (See ***Learning to Learn*** by Robin McCormack and Geri Pancini for more ideas about helping adults return to study.)

In the final part of this unit, attention will be given to revising the four basic operations of +, -, x, and ÷. Students may not be able to complete this section in this time span, and you may need to provide extra support and activities for these students. More advanced students may need extension activities.

Most students gain confidence in working through all the basic operations even if they do not have problems with any of them.

Materials needed:

- Butcher's paper

Activity 1: Reviewing homework

Ask:

- Did anyone find time to complete this homework?
- What obstacles were there in stopping you complete it? (tiredness, children's demands, spouses' attitude, time, space etc.)

Not completing homework is not a good excuse for not coming to class. We all have busy weeks. If you can get work done at home, your progress will be quicker.

Come to class regardless of how much work you have been able to complete at home.

Discuss responses that have been prepared and open to general discussion.

Discuss *survival strategies* in returning to study. (Having time/space made for you to study. Reactions of family/spouse to going back to school).

Activity 2: Expectations

Ask:

- What do you expect of me as a teacher?
- What does the teacher and other students expect of you in class?

Put suggestions up on butcher's paper and pin to wall.

With all these positive statements around us about how to overcome our anxiety to maths, we will need to refer to them and remind each other of them from time to time.

Activity 3: Reviewing basic operations

Today I would like to revise how we do the four operations of multiplication, division, addition and subtraction. There are many different ways of getting the correct answer. We can do them in our head, use pen and paper or use a calculator.

Are there any volunteers who would like to show us how they do this multiplication?

73	What about	73
x 6		x 16

Discuss processes, place value, importance of tables, estimation skills etc. Get students to always check answers on their calculator.

What are the different words we use for multiplication? (E.g. times, lot of, groups of, product)

Use this same approach to go through each operation. Complete the table for the words or phrases that we use for each of the four operations and the equals sign on **Handout 5**. Ask students to work through **Handouts 6 - 10** on basic operations. For students who are confident with basic operations, provide material on fractions and decimals. You may need to have materials such as MAB base 10 blocks, or straws to teach place value or to demonstrate how to do the four operations. Detailed explanation of how to teach place value and the four operations can be found in ***Strength in Numbers*** in the sections **Exploring Numbers**, **Addition and Subtraction** and **Multiplication and Division**.

Below are some notes on some of the operations with suggestions for classroom work.

Skills - Subtraction

What words do we use for <u>subtraction</u>? **eg. take away, minus, less.**

Ask students to complete the table on **Handout 5**. Also write these words with the " - " sign on a poster and leave in the room for students to refer to.

Let's look at different ways of doing subtraction.

Are there any volunteers to show us how they would work this out?

Encourage comments and different strategies.

Let's all revise subtraction.

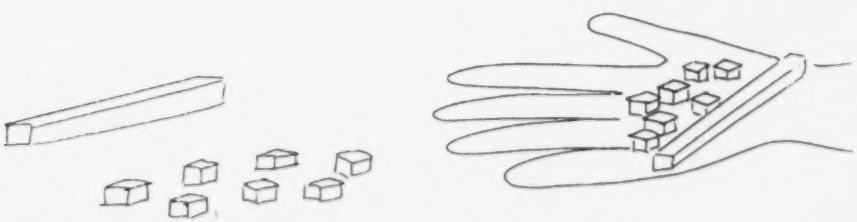
For example, 34 take away 17.

Because we cannot take 7 away from 4, what do we do? Do you remember being told to borrow 10 and then pay back 10? What was the tricky bit about it? If you would like to learn how children in primary school are now being taught subtraction, I will teach you an easier way to understand subtraction.

If you have MAB blocks, show how to *regroup*. (Some people call it 'decomposition').

With MAB blocks show that 34 is 3 *longs* and 4 units.

Now we want to take 17 away. Use the blocks to demonstrate what you are saying. We can easily take 10 away because that is a 1 long one but how do we take away another 7 units when there are only 4 units there?



If it was money, it wouldn't be a problem would it? We often change our money into more suitable coins. For instance, for a parking metre or phone box we can go into any shop and ask for money to be changed into the coins we want.

We could regroup 34 one cent coins to 3 tens and 4 units.
Going back to the problem, we want to take 7 units away, so we change one of the *longs* into 10 units, making 14 units and we can easily take 7 units away now.

Let's now write all this in a mathematical *shorthand* language.

$$\begin{array}{r} 34 \\ -\ 17 \end{array} \quad \text{which is the same as} \quad - \begin{array}{r} 20 + 14 \\ 10 + 7 \end{array}$$

Which we write as:

$$\begin{array}{r} 34 \\ -\ 17 \end{array}$$

When you become very comfortable using blocks and writing problems out in full, you will do subtraction just as quickly using this method as others do using the old method.

Give practical examples of subtraction according to the ability of the student.

Skills - Multiplication

Show the relationship between accumulative addition and multiplication.

e.g. $3 \times 2 = 2 + 2 + 2$ is the same as $2 \times 3 = 3 + 3$

(THE ORDER IS NOT IMPORTANT)

What words do we use for *multiplication*? e.g. times, groups of, lots of.

Ask students to complete the table on **Handout 5**. Write up these words with the "x" sign on a poster and leave in the room for students to refer to.

Discuss process of multiplication, giving practical examples of everyday situations.

e.g. oranges cost 43 cents each. I want 6 of them.
6×43 or 43×6

Revise times tables, giving out blank tables and having students fill them in to reinforce that accumulative addition gives the correct answer.

Skills - Division

Show the relationship between division and multiplication.

e.g. if $3 \times 7 = 21$ then $21 \div 3 = 7$ or $21 \div 7 = 3$

What words do we use for *division*? e.g. how many, ½ = 1 divided by 2, share, etc.

Ask students to complete the table on **Handout 5**. Write these words with the "÷" sign on a poster and leave in the room for students to refer to.

See ***Strength in Numbers*** for more explanations and exercises on division.

At the end of this class you should have a clearer idea as to what areas of number students are having difficulty with.

Student may need to work on these areas throughout the whole of the course.

Remember to allow time for students to fill out their evaluation forms and to discuss their concerns.

HANDOUT 5: *Words for basic operations*

The basic operations are the four processes used in calculating numbers. During the years and across the States, children were taught different words for these operations.

Record in the appropriate box all the words or phrases you can think of to describe that particular process.

Operation Symbol	*Examples of Words*
+	
-	
x	
÷	
=	

Handout 5 is from ***Breaking the Maths Barrier,*** Beth Marr & Sue Helme, Department of Employment, Education and Training, Canberra, 1991, p. 295

HANDOUT 6: *Building addition skills*

1. (a) $\begin{array}{r} 12 \\ +\ 25 \\ \hline \end{array}$ (b) $\begin{array}{r} 81 \\ +\ 14 \\ \hline \end{array}$ (c) $\begin{array}{r} 27 \\ +\ 30 \\ \hline \end{array}$

2. (a) 13 + 52 (b) 52 + 21 (c) 45 + 48

3. (a) 25 more than 14 is .....?

   (b) 18 more than 79 is .....?

4. Find the total of 18 and 23.

5. (a) What is the sum of 27 and 17?

   (b) What is the sum of 51 and 29?

6. (a) Add 78 to 12

   (b) Add 35 and 42

7. What is the total of 12, 23 and 56?

8. Add 39, 40 and 12 together.

9. Add 123 and 340.

10. (a) $\begin{array}{r} 451 \\ +127 \\ \hline \end{array}$ (b) $\begin{array}{r} 180 \\ +\ 217 \\ \hline \end{array}$ (c) $\begin{array}{r} 668 \\ +\ 202 \\ \hline \end{array}$

11. Find the sum of 374 and 123.

12. Do these additions: (a) 127 + 318
(b) 356 + 125
(c) 89 + 112
(d) 526 + 107
(e) 443 + 227

13. 263 more than 128 is .....?

14. Find the answers to these additions:

(a) 127 + 386

(b) 452 + 137

(c) 708 + 154

(d) 255 + 99

(e) 288 + 548

(f) 620 + 193

15. What is the total of 28, 127 and 400?

16. (a) Add 256 and 17 and 312.

(b) Add 37, 169, 200 and 451.

HANDOUT 7: *Building subtraction skills*

1. Do the following subtractions:

(a)	45 - 12	(d)	86 - 30	(g)	52 - 31
(b)	29 - 18	(e)	37 - 26	(h)	68 - 43
(c)	76 - 45	(f)	90 - 40	(i)	19 - 7

2. Find
   (a) 86 minus 24
   (b) 37 minus 14
   (c) 61 minus 40
   (d) 97 minus 73
   (e) 59 minus 47

3. Take 23 away from 88.

4. What is 56 less than 97?

5. Do the following take away problems:

   (a) 36 - 17
   (b) 42 - 25
   (c) 60 - 38
   (d) 78 - 59
   (e) 57 - 17
   (f) 90 - 77
   (g) 83 - 25
   (h) 49 - 28
   (i) 24 - 15
   (j) 67 - 28

6. How much greater is 57 than 26?

7. By how much is 83 bigger than 31?

8. What is the difference between the following pairs of numbers?

(a)	27 and 16	(f)	43 and 87
(b)	85 and 29	(g)	13 and 62
(c)	31 and 76	(h)	74 and 92
(d)	52 and 81	(i)	78 and 33
(e)	60 and 39	(j)	29 and 80

9. Arrange the following numbers in order from smallest to largest:

   78, 53, 92, 23, 32, 15, 65, 42

   Find the increase between **consecutive** numbers, ie. numbers that follow each other.

10. Arrange the following numbers in descending order:

    34, 61, 7, 97, 16

    Find the decrease between **consecutive** numbers.

11. What would you add to 27 to make 56?

12. What is 83 less 18?

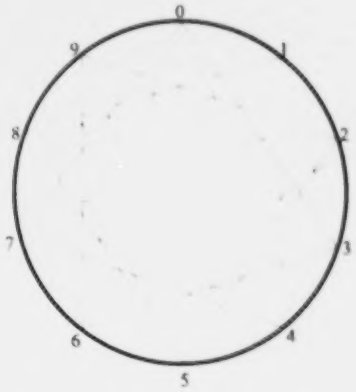
13. What is 15 less than 43?

HANDOUT 8: *Basic operations - Multiplication*

Multiplication is just like adding on. For example, 4 lots of 3 is 4 x 3 = 3+3+3+3 =12. Look back to page 14 to see the different words used.

The more you play with these number facts and become familiar with them, the quicker your response time will be in recalling the answer.

There are a number of ways you can play with these figures, for example:



Start on the zero, say the answer out loud, the last digit of each answer will correspond with the number on the circle.

3,6,9,12

See what pattern emerges when you do the 4 times table, 6 times-table, and the 8 times table.

Repeating patterns is one way to discover the secrets of the times table. You may think up your own ways of quickly recalling the information.

Now fill in the **Multiplication grid** on the next page. Look for patterns. Discuss with others how they remember 5's, 10's, 9's etc..

Multiplication grid

X	0	1	2	3	4	5	6	7	8	9	10
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

HANDOUT 9: *Building multiplication skills*

1. (a) 7 x 8 =
   (b) 3 x 9 =
   (c) 11 x 5 =
   (d) 6 x 4 =
   (e) 8 x 10 =

2. Multiply 12 by 4.

3. Multiply 32 by 4.

4. (a) 81 x 3 =
   (b) 42 x 4 =
   (c) 27 x 8 =
   (d) 65 x 9 =

5. What is 96 multiplied by 3?

6. What are 7 lots of 25?

7. Multiply 143 by 7?

8. What are 75 5's?

9. What is the product of 8 and 224?

HANDOUT 10: *Building division skills*

1. (a) How many 4's in 24?
   (b) How many 5's in 45?
   (c) 48 ÷ 6 =
   (d) 72 ÷ 9 =
   (e) 100 ÷ 10 =
   (f) 77 ÷ 11 =
   (g) 56 ÷ 8 =

2. Divide 64 by 4.

3. Share $90 between 6 people.

4. (a) 81 ÷ 3
   (b) 428 ÷ 4
   (c) 97 ÷ 8

5. Divide 96 children amongst 3 buses.

6. 8 people share 100 apples. How many do they each get?

7. 57 divided between 3 gives .....?

8. Divide 260 by 5.

9. 600 divided between 4 gives .....?

Unit 2: Buying a car

This unit covers what influences the type of car you buy and some of the maths involved in buying a car on credit.

Session 1: The dream car

Materials needed:

- Car advertisements from local and statewide newspapers
- Posters of cars (available from local dealers)
- Video of television advertisements of cars (if possible)
- Car magazines (eg. Motor Mart, state Automobile Association magazines such as RACV or NRMA, etc.)
- Multi Attribute Blocks (MAB) base 10
- Bundles of 10 straws and single straws.
- Money - 1 cent coins (if available), 10 cent coins and 1 dollar coins
- Calculators
- An advertisement from a local or statewide newspaper advertising finance for cars
- Commission rates for car salesmen (from local dealers).

Activity 1: Dreams or reality?

Today we will imagine that we are going to buy a car.

Ask for anyone to comment:

- *What sort of car would you like?* (It doesn't matter if it is unrealistic).
- *What influences your desires?* (Power of advertising, word of mouth etc.).

Show video of (or remember) different car advertisements from television and discuss the market at which it is aimed.

Show a number of advertisements for different cars from magazines (eg. Mazda, Capri, Honda, Volvo, Toyota 4 Wheel Drive). *What market are these aimed at?*

Display the car advertisements obtained from local car dealers around the room.

Go to the car that initially appeals to you. What is it about the image of the car that you like?

Dreams aside now, what do you need in a car for your situation?

Ask for suggestions to be written up on the board.

These might include:

- how much can I afford?
- how many in the family?
- how much travelling do I do?
- is it the only car that the family depends on?

Look up the local newspapers (as well as statewide newspapers) for a suitable car. Decide on a car and keep this car in mind for the remainder of the unit.

Discuss layout of newspaper.

- Where you find the car section.
- Read classified advertisements and discuss how they are presented and written.
- List common abbreviations and discuss.

Ask students to form pairs and discuss their choice of car with their partner. Try to convince them that it is the car for you.

The partner is to assist in the process by asking questions and supporting or expressing doubts about the suitability of the car.

Who else influences your decisions?

Write responses up on the board. (eg. family, girl friend, boss, mechanic, state Automobile Association check, salesman.)

What is the role of the salesman?

How does he get paid? Have accurate information from a local dealer as to commission rates for salesmen.

Using two volunteers, role play a situation, where a couple decide on one of the car advertisements on the wall.

The teacher on one of the students will now play the salesman (have a necktie and jacket or skirt and jacket to feel the part) and try to influence the couple.

Activity 2: Buying a car on credit

Hand out a car advertisement from a local or statewide newspaper that includes offering finance for cars. Use a current advertisement.

Talk about the ways of paying for a car (paying cash, buying on terms, obtaining a bank loan).

Ask the students:
From the advertisement, find the *cash price* for each car.

Then go through the procedure of *buying on terms* - pay a deposit and weekly payments for a period of time.

From the advertisement, find the total cost and deposit (usually in small print at the bottom). Work out the interest in each case by finding the difference between the cash price and total cost. Use a calculator or take this opportunity to revisit subtraction.

The deposit is often given as a percentage. Show students how to work out percentages roughly, in their heads and on calculators. Explanations of percentages and how to calculate them are available in ***Numeracy on the line***.

Work out how much more money each car will cost if you pay it off in instalments, instead of paying cash. Use the current interest rates and find the cost of borrowing the money from the bank (percentage exercise).

Work out the first few examples on the board.

For those who can't work it out independently, show how to complete the task using a calculator. Have students work in pairs if there are not enough calculators.

Skills - Percentage

At what other times do we use percentage? Have current newspapers and look at how many times percentages are used in describing the events that are happening around us.

Review common percentages used: 50% = ½ 75% = ¾
25% = ¼ 10% = $^1/_{10}$

How big is something if it has been increased by 100%? (Doubled)

Give exercises in finding common percentages of numbers.
e.g. 50% of 16 = ½ of 16 = 16 ÷ 2 = 8

Reduce and increase amounts by *percentages*.

e.g. $36.32 reduced by 10%
= $36.32 - 10% of 36.32
= $36.32 - $3.63
= $32.69

For more explanations and exercises on percentages see ***Numeracy on the Line***.

Session 2: Revision or extension activities

Use this session for either revision or extension activities.

Activity 1: Revision or extension

See ***Strength in Numbers*** for co-operative logic activities for buying a car.

See ***Strength in Numbers*** for exercises in subtraction, division and introduction to percentages.

See ***Mathematics A New Beginning*** for exercises in percentages.

See ***Numeracy on the line*** for exercises in percentages.

See ***Attacking Number Skills*** for graded skill exercises in subtraction and division.

See ***Car Mathematics*** for extension material.

Remember to allow time for students to fill out their evaluation forms and to discuss their concerns.

Unit 3: How much?

This unit covers measuring length and volume.

Session 1: Measuring length and volume

Materials needed:

- Metre rulers
- Tape measures, rulers
- Trundle wheel
- Multi Attribute blocks (MAB) base 10
- Different size bottles and boxes
- measuring cups of different sizes or a graduated measuring cup
- Petrol tanks from different makes of cars (if possible)
- Milk Cartons

Activity 1: Measurement - length

How tall are you?

Do you think in metric or imperial terms?

Measure the height of everyone in the class.
List the heights in centimetres and metres.
Rank in order.

What is the difference in height between the tallest and the shortest class members?

By estimating and measuring, find a part of your hand or body which measures the following:

1 cm	(usually width of small fingernail)
10 cm	(usually across knuckles of 4 fingers)
20 cm	(usually hand span)
30 cm	(usually elbow to wrist)
100 cm	(usually waist to floor)

Write units on the board and show relationship between them.

				$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
1000	100	10	1			
km			metre	deci	centi	milli

Estimate the length of the table, height of the door, length of your arm and your height.

Without a ruler, draw a line 5 cm in length.

Measure with a ruler. How accurate were you?

Draw a line 15 cm in length. Don't use a ruler.

Measure with a ruler. How accurate were you?

For more information on introducing metrics see ***Mathematics: A New Beginning***, *Introducing Metric Length* p. GS 35 - 36.

Activity 2: Measurement - volume

Now let's look at volume measurements.

Hold up different sized bottles and boxes.

Can you put them in order from the smallest volume to the biggest volume?

Estimate and then check results by filling, comparing and measuring.

When do we use millilitre measurements? What's the abbreviation? (e.g. medicines, chemicals, make-up, etc.; mls)

When do we use litre measurements? (e.g. milk, petrol, water, etc.)

How many millilitres (mls) in one litre?

How big is a litre? (eg. one milk carton or the 10 cm sided cube from MAB Kit. This is a good visual model).

How many millilitres (mls) or litres would each of the bottles or boxes hold. Guess first and then measure.

If you were able to get some petrol tanks, look at them and estimate how many litres they would hold. If possible, fill them with water and compare the volume of each.

Discuss.

How much does it cost you to fill up your car with a tank of petrol?

Do you fill up when you need to, or put in what you can afford?

What does a 4.2 litre engine mean or 2500cc?

When do we use cubic centimetres (i.e. cc's) or cm^3 instead of litre measurements? (e.g. engine capacity)

When do we use cubic metres? (e.g. soil)

Homework activity

Find out how big the petrol tank is in your (or a friend's) car. That is, how many litres does it hold?

How far can you go on one full tank of petrol?
(PLEASE DON'T RUN OUT OF PETROL JUST TO FIND OUT!!)

Discuss more reasonable ways of finding out.

Remember to allow time for students to fill out their evaluation forms and to discuss their concerns.

Session 2: Measuring petrol usage

Materials needed:

- Information on petrol efficiency of different cars (available from the Automobile Association in your state or Environment Protection Agency)

Activity 1: How much petrol?

Revise homework.

How big is your petrol tank?

How much does a litre of petrol cost?

Using this information, how much would it cost to fill up your tank?
i.e. size of tank x cost per litre

Those who cannot multiply should use a calculator.

To determine how efficiently a car uses petrol, we once referred to how many miles per gallon our car could do. The larger the number of miles, the more efficient the car was.

How many people still think of how economic their car is in terms of how many miles you could go on one gallon of petrol?

What is the metric measure of petrol efficiency? (litres per 100 km)

This reading is very different to the imperial one which had distance per volume. The metric measure is volume per 100 kilometres.

Write: miles per gallon
litres per 100 km

The lower the number of litres, the more economical it is to drive.

Use some examples of the petrol consumption of different cars from the RACV (state Automobile Association). Which cars are better? Look at differences.

What is the petrol consumption of your (or your friend's) car?

Help students to use their figures for the volume of their petrol tank and the distance they think they get from a full tank of petrol to work out their car's petrol consumption. Compare this to listed values, often provided by car manufacturers or from lists provided by the state Automobile Association or Environment Protection Agency. Is there a difference? Why? Discuss.

Activity 2: Extra work on multiplication and volume

For those who need extension work

With paper, make a cube that is 2cm high, 2cm wide and 2cm long. How many 1cm cubes does it hold?

Draw up a table on the board for students to work in pairs to complete.

Side of cube (cm)	Volume (cm^3)
1	.....
2	.....
3	.....
4	.....
5	.....
6	.....

What is the relationship between the size of the cubes and the volume of the cube. What is the formula?

L X W X H

Is it the same for rectangles?

Construct rectangular prisms and test the formula.

Give out A4 paper and construct a cylinder. Encourage students to make one cylinder tall and thin and one short and wide.

Which is larger? What is the surface area? What is the volume? How could we find out which has the larger volume?

Attach cylinders to a base and compare volume. We could fill a paper cylinder with small beads or sand.[1]

Remember to allow time for students to fill out their evaluation forms.

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[1] These activities are from *Mathematics A New Beginning - Discovering Metric Volume* pp. MM23 - 29.

The extension exercise on petrol consumption comes from ***Car Mathematics***, *How far on a tank?* p. 34 - 35 and ***Car Mathematics***, *The Great Race - James Hardie 1000*, p.40 - 41

Unit 4: Keeping your licence

This unit is about drinking, driving and some of the maths involved.

Session 1: Drink driving

Materials needed:

- A video on alcohol consumption. A good one is ***Name your poison*** (videos may be available at drug and alcohol rehabilitation centres, libraries and drug and alcohol association in your state)
- Statistics of alcohol related accidents, comparing Australian states (from Traffic Accident Commission, Victoria or equivalent in your state)
- Current costs of drink driving and speeding fines (available from Police stations)
- ***Traffic Handbook*** used in your state
- brochures and/or newspaper articles on drinking and driving.

Activity 1: Drinking and driving

How can we lose our licence? (Drink driving, speeding, accident)

What is the most common way of losing your licence? (Drink driving)

Which is most socially acceptable? (Most people admit that they were speeding and are even proud of how quickly they can get to from one place to another).

What are the costs of speeding fines? (Have a copy from the police station).

What are the costs of drink driving? (Automatic cancellation if on probationary licence, fines, suspension or cancellation of licence for other drivers according to level of alcohol and previous offences).

What is the legal limit in this State? (Victoria has the legal limit of 0.05% for blood alcohol content.)

What are the legal limits in other States?

The more alcohol you drink, the more your body adapts to alcohol and of course, the more damage it does to your body organs.

People can go into a coma from having had too much alcohol and some can even die.

Can you remember parties where drinks have been "spiked" to see how drunk the person can become?

HANDOUT 1: *0.05%*

Work through orally allowing for discussion about standard drinks, different strengths of beer, differences between men and women, and the rate that the body gets rid of alcohol. Do some sample calculations as a group and then let students answer the questions on the sheet.

Activity 2: To drive or not?

Show a video on the effects of drinking. (The video, ***Name your poison***, is a good one to use. It presents facts about alcohol consumption in a game show situation. Students could be encouraged to predict what the correct answers will be.)

Discuss strategies for how not to exceed the legal blood alcohol content level or what to do if you do:

- having an elected driver who is not drinking
- taking a taxi
- alternating alcoholic drinks with non-alcohol.

Reinforce that the body takes one hour to get rid of 0.01% of alcohol and **nothing** will speed up the process (ie. cold showers, black coffee, etc.).

Activity 3: Pamphlets and articles

Give students pamphlets or relevant newspaper articles on the effects of drinking and drinking and driving.

Discuss

Ask students if they would like to visit a local alcohol and drug referral agency.

Remember to allow time for students to fill out their evaluation sheet. Check to see if they have any comments or concerns they would like to raise in the class.

Session 2: Alcohol and your body

Materials needed:

- Empty beer cans and bottles, wine bottles, spirit bottles and a range of drinking glasses, and a measuring cylinder or alternative for measuring standard drink amounts.

Activity 1: Revision

Revise work done in the previous part of Unit 4.
For example:

- assuming that you had no alcohol in your body, how many beers can you safely drink in one hour and stay below the legal limit for driving?
- why is it inadvisable to drink wine in beer glasses?

It is relevant here to visit the local alcohol and drug referral centre if the students have expressed an interest in doing so.

Activity 2: How many drinks?

Use the empty beer cans, wine bottles, spirit bottles and the standard glasses to measure how many standard drinks are held in each of the bottles. Use the information from Session 1 and **Handout 1: *0.05%*** to do the calculations. This could be extended by using the fact that a standard drink contains 10 grams of alcohol. Use the volume of the containers and the alcohol strength of the drink to work out how many grams of alcohol are in each container of drink, and therefore how many standard drinks.

Activity 3: More practice

- **For volumes and percentages:**
  Mathematics A New Beginning

- **For decimals and percentages:**
  Numeracy on the Line

- **For percentages:**
  Road Safety and RBT in ***Car Mathematics***, p.14 - 15

Remember to allow 5 minutes for students to fill in their evaluation sheet.

HANDOUT 1: *0.05%*

How much can you drink?

As a rough guide, to stay **below** the Blood Alcohol Content (BAC) limit of 0.05%:

Men: should drink not more than **two** standard drinks in the **first** hour and **one** drink each hour after that

Women: should drink not more than **one** standard drink in the **first** hour and **one** drink each hour after that.

How long does it take to become sober after drinking?

The body gets rid of **0.01%** of blood alcohol in 1 hour (if you are NOT drinking).

Standard drinks

Standard drinks are approximately the following amounts, but the exact amounts will depend on the alcohol content of the individual drink:

Light beer:
570 ml

Normal beer:
285 ml

Wine:
100 ml

Fortified wine (port, muscat, etc)
60 ml

Spirits
30 ml

Use the information on the sheet to answer the following questions:

1. If a man has two 200 ml glasses of wine in two hours, will he probably be over or under the 0.05% BAC limit? What about a woman?

2. If a woman has three mixed drinks each containing 30 ml of spirits in two hours, will she probably be over or under the 0.05% BAC limit? What about a man?

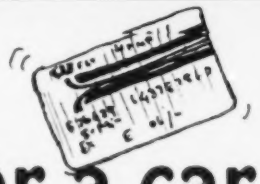
3. How long would it take a driver with a BAC of 0.08% to become completely sober?

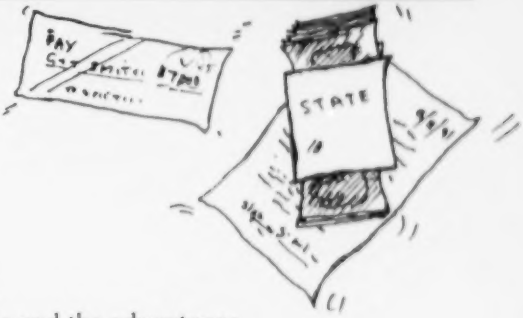
4. How long would it take a driver with a BAC of 0.14% to become completely sober?

5. How long would it take a driver with a BAC of 0.2% to become completely sober?

6. A driver with a BAC of 0.15% goes to bed at 1.30am. What percentage of alcohol will be still in his blood at 8.30 am? Will he be sober enough to legally drive to work?

Unit 5: Paying for a car





This unit is about the different ways of paying for a car.
Session 1 looks at some of the financial options available and the advantages and disadvantages of them. In Session 2 the advantages of buying a new or a second hand car are discussed.

Session 1: How will you pay for your car?

Materials needed:

- Copy of a hire purchase agreement
- Bankcard account
- Information about bank loans
- Advertisements used in Unit 2
- Newspaper advertisements.

Activity 1: Ways of paying

Let's think of the car that we wanted to buy a couple of weeks ago (they can be dreams if you want).

Today we are going to find out how we are going to pay for the car.

List options that students are aware of, such as:

- cash
- hire purchase
- bank loans
- private loan from family
- bankcard
- finance from motor sales.

What are the advantages/disadvantages of each of these?

What experiences have you had in paying for a car?

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Where will you go for a loan to pay for your car?

- bank
- motor yard
- other.

Remember you have to pay a deposit or trade-in before you can begin to pay off the car.

Why does it cost more to pay off on terms? (Car yard costs, the costs of processing the loan, staffing, etc.)

What are the additional costs? (Tax, insurance, stamp duty, etc.)

Look closely at hire purchase agreement and loan forms. Discuss language used, information needed and procedure required.

Look closely at Bankcard account. What payment is required immediately?

What is the interest free time span on your Bankcard? If you cannot pay it all off, what will the interest be on the remainder? What are the charges on "cash advance"?

On the board, work out 16% interest rate on $2,000.

Discuss how it is calculated on a daily rate. Show how to work it out on a calculator.

Activity 2: How much?

For independent students, find current cash and term prices for a car (look back at the advertisements you used in Unit 2 which showed the cash price you would pay for a car as well as what you would pay if you bought the car on terms). Determine what the deposits would be and what the total repayments add up to.

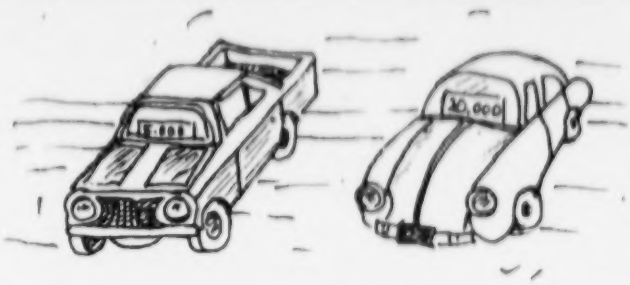
Remaining students work through an example orally, using calculators. Check to see that the total price is the same as the total price listed.

Activity 3: Further work

Continue with skill development using the exercises in:

- ***Attacking Number Skills***
- *Fractions* in ***Mathematics A New Beginning***
- *Fractions in Action* in ***Mathematics A New Beginning***
- *Have We Got A Deal For You* in ***Car Mathematics.***

Session 2: New or old?



Materials needed:

- Depreciation sheets from local car dealers
- Local and state newspapers.

Activity 1: Why are second-hand cars cheaper?

Why are second-hand cars cheaper than new cars?

List advantages and disadvantages in buying a new car and a second-hand car.

Check value of cars in depreciation booklet and compare with newspaper advertisements from car yards and private sellers.

Discuss why there may be differences. (Car yards have to give a warranty on any second-hand car they sell, it costs them money to advertise and sell cars. Private sales provide the buyer with a knowledge of the previous owner; they might particularly like the colour, interior or how well looked after the car is, and be prepared to pay more for it).

Activity 2: Skills development and reinforcement

For graded skill development in basic operations you could use exercises from ***Attacking Number Skills***.

For extension material you can use the following:

- *Fractions* in ***Mathematics A New Beginning***
- *Fractions in Action* in ***Mathematics A New Beginning***
- *Very Interesting* in ***Car Mathematics.***

Remember to allow students time to fill in their evaluation forms and to discuss their concerns.

Unit 6: Running costs

The different costs of running a car are the focus of this unit.

Session 1: Cars cost

Materials needed:

- Car magazines giving costs of running a car for a year. A good source of this information could be your state Automobile Association e.g. RACV or NRMA
- Petrol account of how much it costs an average family for petrol per week
- Calculators.

Activity 1: Where does your money go?

Where does your money go each week or fortnight?

If the group is willing to share, ask them how much of their money goes on:

- rent
- food
- laybys
- petrol/public transport
- entertainment
- savings
- other.

Find an average of how much the class spends on each of these items. Get the class working it out in groups, with the aid of calculators.

Allow for discussion of comparisons. Students may share concerns at how much others spend and make suggestions as to how they manage their money.

Are your total expenses less than your set income? Can you save any money?

What are the fixed payments you have to make each week or month? What are some areas that you could save on? Would anyone like to share their personal information?

Activity 2: Costs of running a car

For those of you who have cars, how do you budget for your car? Do you set aside a set amount for petrol each week? Do you pay your bills as best you can when they come in?

What costs are there?

List these: eg.

- repayments each month
- petrol bill monthly or each fill up
- tyres/repairs etc.
- insurance - compulsory third party
- registration.

Do you decide where you go by how much money you have in cash?

If we wanted to go on holiday, what things do we have to take into account?
For example,

- how many people would fit in the car
- is it more convenient to travel by car
- would it be easier to travel by train?

Let's look at how expensive it is to run a car.

Look at current costs in car magazines and discuss how they arrived at these figures, taking into account the original cost of the car as well.

Activity 3: More practice

For skills development and reinforcement in graded exercises:

- ***Attacking Number Skills***.

For extension material:

- *Fractions* in ***Mathematics A New Beginning***
- *Fractions in Action* in ***Mathematics A New Beginning***
- *Can I Afford to Keep it?* in ***Car Mathematics***.

Session 2: More than money

Materials needed:

- Ambulance cover costs and benefits
- state Automobile Association e.g. RACV or NRMA membership costs and benefits
- Insurance costs for drivers of different ages
- Life insurance information.

Activity 1: Life and death

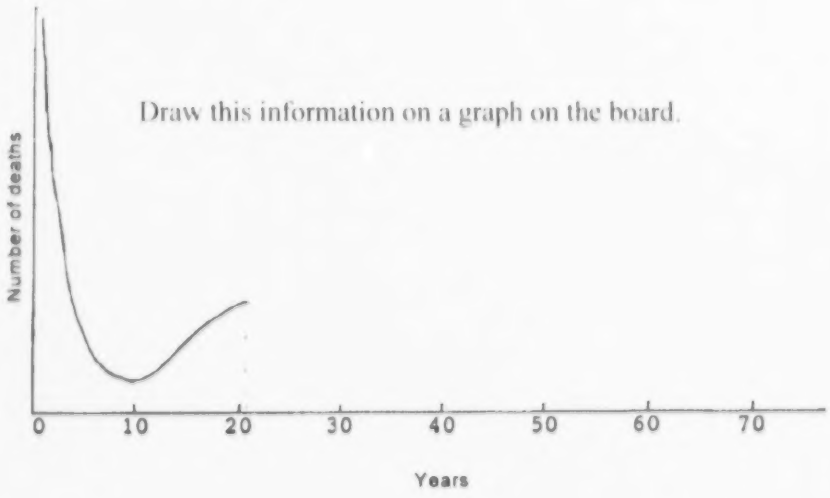
Today we are going to look at mortality rates. Yes, that means when we are most likely to die.

What do you think is the safest age to be?
Ask for responses and write them on the board. (The correct answer is 10 years of age.)

At what age do most young people die?
List responses on the board. (Answer - 21).

The most dangerous age for young people used to be 19 years. Why has it changed to 21?
(Because on a probationary licence, which lasts for 3 years, drivers are permitted zero blood alcohol reading.)

Draw this information on a graph on the board.



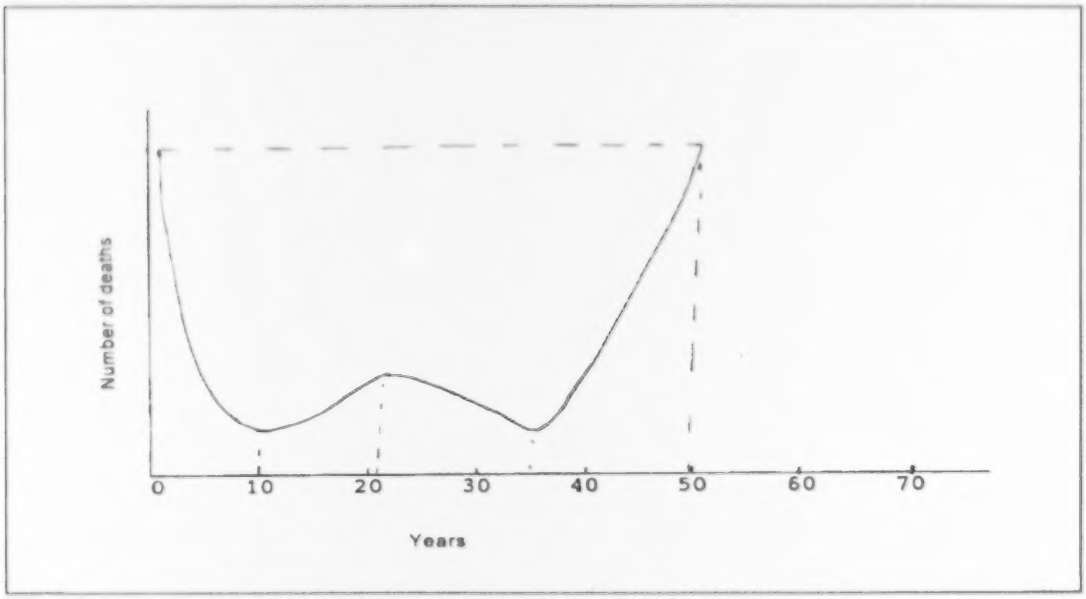
As an adult, when do you think you are at the same risk level as a 10 year old?
List responses. Most will suggest the age that they are now at. The correct answer is 35 years.

When do you think you have the same mortality rate as a new born baby?
List responses. (The correct answer is 50 years.)

Draw these results on to the graph.

How do you think the graph will go now?

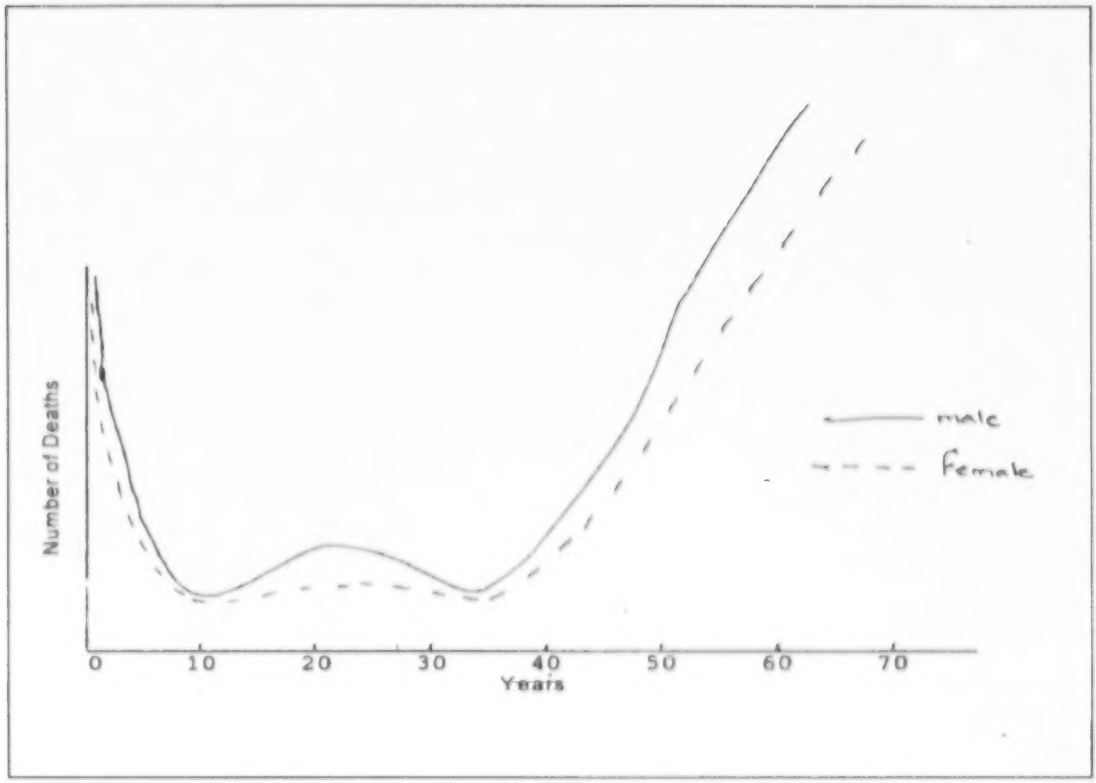
We are on the downhill skid now. Continue drawing the line upwards because the older we get, the more likelihood we have of dying.



The graph we have been looking at is made up from statistics of male deaths. What would you imagine the graph for female deaths to look like?

Draw a rough sketch of how you would imagine it to be.

Draw the line showing the female deaths on the board.



What do you notice about it? How is it similar? How is it different?
Discuss the major difference in the absence of the pronounced increase at 21 years of age.

What are some of the reasons why females are safer at 21 then men? (Stricter control by parents?, not as pressured by peers? socialisation?, etc.).

In recent years, the graphs are getting closer together. Why do you think this could be?
(Sex roles less defined, increase in number of women smoking, stress related diseases, etc.).

How do these statistics relate to car insurance? When do you think car insurance would cost you the most? At what age are you at most risk?
Compare to insurance tables.

At what age do you think it should be cheaper? Does the insurance cost reflect this? What other issues relate to insurance?
(Non-drinkers can get cheaper insurance, just like non-smokers get cheaper life insurance).

Activity 2: Covering yourself

How many people are members of their state Automobile Association (give relevant name eg NRMA, RACV)? What does it cover? What are the advantages in being a member?
Discuss costs and benefits.

How many take ambulance cover? Why do you think it is available?
Discuss costs and benefits of cover.

Activity 3: Further practice

For skills development and reinforcement in graded exercises:

- ***Attacking Number Skills***

For extension material:

- *Fractions in Action* in ***Mathematics A New Beginning***
- *Enormous NRMA* in ***Car Mathematics***.

Allow 5 minutes for students to fill in their evaluation sheet. Allow time to discuss with students their comments or concerns about the course.

Teacher's checklist

Make some notes for each student about their development over the period of the course.

Student's Name: _____

Motivation level:

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Attitudes toward maths:

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Skills development:

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Student's Name: _____

Motivation level:

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Attitudes toward maths:

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Skills development:

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Resources

Attacking Number Skills
Compiled by Bruce Wicking
McMillan Company Australia Pty Ltd

Car Mathematics
Mathematics for Living Series
Kevin Ford,
Holmes McDougall Australia and Educational Supplies Pty Ltd, NSW, 1986

Figure It Out
Book 3
Fenby-Wade Carmichael
Pitman Publishing Pty Ltd, Carlton, 1979

Fractions
Video and workbook: Home video series;
Gosford, NSW

Mathematics A New Beginning*
Edited by Beth Marr and Sue Helme
Teaching Maths to Women Project, State Training Board of Victoria, 1987

Numeracy on the Line*
Beth Marr, Chris Anderson and Dave Tout
National Automotive Industry Training Board, Doncaster, Victoria, 1994

Strength in Numbers - A resource book for Teaching Adult Numeracy*
Ruth Goddard, Beth Marr, Judith Martin;
Adult, Community and Further Education Board, Victoria, Melbourne, 1991

For information on alcohol and drink driving contact the drug and alcohol centre in your state. Public libraries and community health centres may also hold videos and other resources on the effects of alcohol and drinking and driving.

* These resources are available from ARIS, Language Australia, GPO Box 372F, Melbourne VIC 3001. Ph: 03 9614 0255, fax: 03 9629 4708